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(54) **Lithographic projection apparatus with substrate holder**

(57) A lithographic projection apparatus comprising:

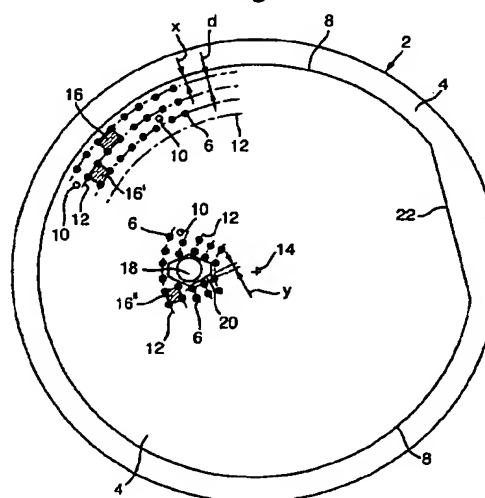
- a radiation system (7) for supplying a projection beam (25) of radiation;
- a mask table (5) provided with a mask holder (27) for holding a mask (29);
- a substrate table (1) provided with a substrate holder (17) for holding a substrate (19);
- a projection system (3) for imaging an irradiated portion of the mask (29) onto a target portion (35) of the substrate (19),

- the wall (8) is substantially circular, and is concentric with the said circles (12);
- the radial distance x between the wall (8) and the circle (12) nearest thereto satisfies the relationship $0.3 < x/d < 0.6$, where d is the mutual radial separation of the two circles (12) nearest the wall (8).

the substrate holder (17) comprising a plate (2) having a face (4) which is provided with a matrix arrangement of protrusions (6), each protrusion (6) having an extremity (6') remote from the face (4) and being thus embodied that the said extremities (6') all lie within a single substantially flat plane (6'') at a height H above the face (4), the substrate holder (17) further comprising a wall (8) which protrudes from the face (4), substantially encloses the matrix arrangement, and has a substantially uniform height h above the face (4), whereby $h < H$, the face (4) inside the wall (8) being provided with at least one aperture (10) extending through the plate (4) and through which the area enclosed by the wall (8) can be accessed, whereby:

- the matrix arrangement comprises a series of concentric circles (12) whereby the protrusions (6) are disposed along each circle (12) at substantially regular arcuate intervals;

Fig.1.



EP 0 947 884 A3



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EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.8)
A	US 5 324 012 A (AOYAMA ET AL.) 28 June 1994 (1994-06-28) * column 1, line 16-20; figures 3,4 * * column 6, line 51 - column 7, line 4 *	1-11	G03F7/20
A	US 5 583 736 A (ANDERSON ET AL.) 10 December 1996 (1996-12-10) * column 4, line 19-48; claims 1,11,13,20; figure 2 *	1-11	
A	US 4 213 698 A (FIRTION ET AL.) 22 July 1980 (1980-07-22) * claim 1; figures 1,2 *	1-11	
A	PATENT ABSTRACTS OF JAPAN vol. 12, no. 65 (E-586), 27 February 1988 (1988-02-27) & JP 62 208647 A (FUJITSU LTD.), 12 September 1987 (1987-09-12) * abstract *	1-11	
E	US 5 923 408 A (TAKABAYASHI) 13 July 1999 (1999-07-13) * column 7, line 38-60; claims 1-9; figures 11,17 *	1-11	TECHNICAL FIELDS SEARCHED (Int.Cl.8) G03F
A,P	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 10, October 1998 (1998-10) & JP 10 128633 A (NIPPON TELEGR. & TELEOH. CORP.) * abstract *	1-11	
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 23 May 2001	Examiner Thiele, N
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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ON EUROPEAN PATENT APPLICATION NO.**

EP 99 30 2392

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23-05-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5324012 A	28-06-1994	JP 5021584 A	29-01-1993
US 5583736 A	10-12-1996	NONE	
US 4213698 A	22-07-1980	DE 2901968 A	26-07-1979
		FR 2415368 A	17-08-1979
		GB 2016166 A,B	19-09-1979
		IT 1118308 B	24-02-1986
		JP 1319877 C	29-05-1986
		JP 54120585 A	19-09-1979
		JP 60015147 B	17-04-1985
		NL 7900497 A	25-07-1979
		SE 444526 B	21-04-1986
		SE 7900230 A	24-07-1979
		US RE31053 E	12-10-1982
JP 62208647 A	12-09-1987	JP 2010370 C	02-02-1996
		JP 7027959 B	29-03-1995
US 5923408 A	13-07-1999	JP 10233433 A	02-09-1998
		KR 182756 B	01-04-1999
JP 10128633 A	19-05-1998	NONE	

EPO FORM P0459

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